

A Non-Linear Multiple-Model State Estimation Scheme For Pipeline Leak Detection And Isolation

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**PROFESSIONAL ENGINEERING PUBLISHING LTD, PROCEEDINGS OF THE
INSTITUTION OF MECHANICAL ENGINEERS PART I-JOURNAL
OF SYSTEMS AND CONTROL ENGINEERING; pp: 497-512; Vol: 216**

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Summary

Model-based monitoring schemes are known to have a great potentials in detection and localization of leaks in pipelines. Fluid flow in pipelines is characterized by a system of non-linear-coupled partial differential equations. Since state estimation can provide the basis for real-time monitoring of fluid flow in pipelines, a suitable numerical scheme is employed to formulate the problem in state-space form, which enables the development of state estimation techniques. A modified extended Kalman filter (MEKF) in conjunction with feed forward computations to anticipate the leak magnitude provides the core of the adaptive multimodel state estimation technique used in this paper. Numerical simulation results show that the developed state estimation scheme effectively detects and locates small leaks in pipelines within a short time duration.

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